

WHAT IS CLAIMED IS:

1. A synchronous signal generating method in which a plurality of coding tables is used to subject an input data word of p-bits to modulation and to thereby obtain a code word of q-bits ( $q > p$ ), said plurality of coding tables storing the code words corresponding to the respective input data words, and state information indicating the coding table for use in modulating a next input data word to obtain a next code word satisfying a predetermined run length restriction rule even with the next code word coupled directly with the code word, and a synchronous signal for decoding reproducing data is inserted into every predetermined number of code words in a string of the code words satisfying said predetermined run length restriction rule, so as to generate a synchronous frame,

wherein said synchronous signal is separable from said string of code words satisfying said predetermined run length restriction rule, and comprises a specific code for identifying the position in one sector and a synchronous pattern comprising a first bit pattern of a run length longer than a maximum run length in said predetermined run length restriction rule by  $1T$  or more ( $T$  is a period of channel bit of the code words) and a following second bit pattern of a run length longer than a minimum run length, and said synchronous pattern includes part of a following code word.

2. A synchronous signal generating method according to claim 1, wherein a specific coding table and another specific coding table of said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, and when said predetermined input data word is modulated, the

code word having a smaller absolute value is selected from an absolute value of a DSV value obtained from the code word using said specific coding table, and an absolute value of a DSV value obtained from the code word modulated using said  
5 other specific coding table, and the DSV control is performed, and a synchronous signal for decoding reproducing data is inserted into every predetermined number of code words in a string of the code words satisfying said predetermined run length restriction rule, so as to generate the synchronous  
10 frame.

3. A synchronous signal generating method according to claim 1, wherein a plurality of synchronous signal tables is prepared corresponding to said plurality of coding tables,  
15 and a plurality of synchronous signal bit patterns for generating said synchronous signal is set in each of said synchronous signal tables, each of said synchronous signal bit pattern having two bit patterns in even/odd relation such that the number of "1" is even in one pattern and is odd in  
20 the other pattern to allow selection therebetween by a DSV control.

4. A synchronous signal generating method according to claim 1, wherein said p bit is 8 bit, said q bit is 15 bit,  
25 and said run length restriction rule sets a minimum run length of a signal of the code words subjected to NRZI conversion at 3T without said synchronous signal and a maximum run length at one of 11T, 12T, 13T and 14T.

5. A recording apparatus in which a plurality of coding tables is used to subject an input data word of p-bits to modulation and to thereby obtain a code word of q-bits ( $q > p$ ), said plurality of coding tables storing the code words corresponding to the respective input data words, and state  
30 information indicating the coding table for use in modulating a next input data word to obtain a next code word satisfying  
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a predetermined run length restriction rule even with the next code word coupled directly with the code word, and a synchronous signal for decoding reproducing data is inserted into every predetermined number of code words in a string of  
5 the code words satisfying said predetermined run length restriction rule, so as to generate a synchronous frame and sequentially record synchronous frames in a recording medium,

wherein said synchronous signal is separable from said  
10 string of code words satisfying said predetermined run length restriction rule, and comprises a specific code for identifying the position in one sector and a synchronous pattern comprising a first bit pattern of a run length longer than a maximum run length in said predetermined run length  
15 restriction rule by 1T or more (T is a period of channel bit of the code words) and a following second bit pattern of a run length longer than a minimum run length, and said synchronous pattern includes part of a following code word.

20 6. A recording apparatus according to claim 5, wherein a specific coding table and another specific coding table of said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective  
25 predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, and when said predetermined input data word is modulated, the code word having a smaller absolute value is selected from  
30 an absolute value of a DSV value obtained from the code word using said specific coding table, and an absolute value of a DSV value obtained from the code word modulated using said other specific coding table, and the DSV control is performed, and a synchronous signal for decoding reproducing data is  
35 inserted into every predetermined number of code words in a string of the code words satisfying said predetermined run

length restriction rule, so as to generate the synchronous frame.

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7. A transmitting apparatus in which a plurality of  
5 coding tables is used to subject an input data word of p-bits  
to modulation and to thereby obtain a code word of q-bits  
( $q > p$ ), said plurality of coding tables storing the code words  
corresponding to the respective input data words, and state  
information indicating the coding table for use in modulating  
10 a next input data word to obtain a next code word satisfying  
a predetermined run length restriction rule even with the  
next code word coupled directly with the code word, and a  
synchronous signal for decoding reproducing data is inserted  
into every predetermined number of code words in a string of  
15 the code words satisfying said predetermined run length  
restriction rule, so as to generate a synchronous frame and  
sequentially transmit synchronous frames by wire or radio,  
wherein said synchronous signal is separable from said  
string of code words satisfying said predetermined run length  
20 restriction rule, and comprises a specific code for  
identifying the position in one sector and a synchronous  
pattern comprising a first bit pattern of a run length longer  
than a maximum run length in said predetermined run length  
restriction rule by  $1T$  or more ( $T$  is a period of channel bit  
25 of the code words) and a following second bit pattern of a  
run length longer than a minimum run length, and said  
synchronous pattern includes part of a following code word.

8. A transmitting apparatus according to claim 7,  
30 wherein a specific coding table and another specific coding  
table of said plurality of coding tables are allotted to have  
an even/odd relation such that the number of "1" in each of  
the code words stored corresponding to the respective  
predetermined input data words is even in the specific coding  
35 table and the number of "1" in the code word is odd in the  
other specific coding table so as to enable a DSV control,

and when said predetermined input data word is modulated, the code word having a smaller absolute value is selected from an absolute value of a DSV value obtained from the code word using said specific coding table, and an absolute value of a DSV value obtained from the code word modulated using said  
5 other specific coding table, and the DSV control is performed, and a synchronous signal for decoding reproducing data is inserted into every predetermined number of code words in a string of the code words satisfying said predetermined run  
10 length restriction rule, so as to generate the synchronous frame.

9. A recording medium which is recorded using the synchronous signal generating method according to claim 1.  
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10. A transmission medium which is transmitted using the synchronous signal generating method according to claim 1.

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